Groundwater & Environmental Services of Puerto Rico, LLC

GROUNDWATER MONITORING RESULTS
JUNE 2012
SANTA ISABEL MUNICIPAL LANDFILL
SANTA ISABEL, P.R.

GESPR Project Number: 7100398

JUNE 2012

Omar Negrón Cabrera, PG
Senior Project Manager

Isidro M. Perera Armas
PR Operations Manager

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Prepared for:

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Land-Tech

Prepared by:

GROUNDWATER & ENVIRONMENTAL SERVICES OF PUERTO RICO, LLC
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FINAL REPORT

GES PR

June 30, 2012

Efrain Camis
Project Engineer
Landfill Technologies of San Juan Corporation
PO BOX 13484
San Juan, PR 00908

RE: GROUNDWATER MONITORING RESULTS
JUNE 2012
SANTA ISABEL MUNICIPAL LANDFILL
SANTA ISABEL, P.R.

INTRODUCTION

This report presents the groundwater monitoring results for the period of June 2012 according to the Groundwater Monitoring Plan presented to the EQB for the Santa Isabel Landfill. The monitoring report is intended to comply with the Non Hazardous Waste Regulation which requires the monitoring of 41 volatile compounds and 15 metals.

Enclosed, **Figure 1** presents the location of the landfill in a United States Geological Survey (USGS) Map and an aerial photograph for visual aid.

The groundwater monitoring effort for June 2012 consisted in the sampling of two down gradient wells (**GWMW-2** and **GWMW-3**). The up gradient groundwater well (GWMW-1) has not been constructed.

FIELD ACTIVITIES

The groundwater monitoring event was conducted in June 14, 2012. GESPR personnel with OSHA HAZWOPPER training and Level D PPE proceeded to collect the field parameters and groundwater samples. Field Data information is provided in **Attachment 1**. After water samples

were collected and preserved they were sent to Pace Analytical for Volatiles and Metal Analysis according to the work plan requirements.

Location of Santa Isabel wells is presented in **Figure 2**.

SAMPLE COLLECTION

Each well was identified, developed and sampled according to the presented work plan. Water samples were collected for Volatile Organic compound analysis following method **8260** and for Metals following method **200.7**. Chain of custody forms are presented in **Attachment 2**.

RESULTS

VOLATILE ORGANICS

Table 1 presents the results for the volatile organic compounds. No volatiles were detected for both (**GWMW-2**. and **GWMW-3**) samples.

METALS

Table 2 presents the metal concentrations for both sampled wells. Metal concentrations above the MCL were observed for:

- Lead: GWMW-2, GWMW-3.

Attachment 3 presents the laboratory certified results from Pace Analytical.

RECOMMENDATIONS

The following recommendations are made:

- Continue with the Groundwater sampling event of October 2012 to compare the metal concentrations obtained in this event;
- Rehabilitation of both groundwater wells (casings);
- Installation of the up gradient GWMW-1.

Sincerely,

Groundwater & Environmental Services of PR, LLC.

Omar Negrón Cabrera, P.G.
Senior Project Manager

OMAR NEGRON CABRERA
LICENCIA NUM. 017
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GEOLOGO PROFESIONAL LICENCIADO

TABLE 1
SANTA ISABEL LANDFILL
ANALYTICAL RESULTS - ORGANIC VOLATILE COMPOUNDS (MG/L) METHOD 8260
JUNE 2012

ANALYSIS PARAMETERS			QA/QC SAMPLES			GROUNDWATER WELL SAMPLES						
						UPGRADIENT WELL		COMPLIANCE WELLS				
NOMBRE	CAS NO.	MCL	TB	FB	EB	GWMW-1	GWMW-1D	GWMW-2	GWMW-2-D	GWMW-3	GWMW-3-D	RL (mg/L)
ACETONE	67-64-1	4	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
BENZENE	71-43-2	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
BROMODICHLOROMETHANE	75-27-4		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
BROMOFORM	75-25-2	0.7	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
BROMOMETHANE	74-83-9	0.05	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
2-BUTANONE (MEK)	78-93-3		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
CARBON DISULFIDE	75-15-0	4	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
CARBON TETRACHLORIDE	56-23-5	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
CHLOROBENZENE	108-90-7	0.7	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
CHLOROFORM	67-66-3	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
CHLOROMETHANE	74-87-3	0.2	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
DIBROMOCHLOROMETHANE	124-48-1		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,2-DIBROMOETHANE (EDB)	106-93-4		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
DICHLORODIFLUOROMETHANE	75-71-8		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,1-DICHLOROETHANE	75-34-3	0.007	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,2-DICHLOROETHANE	107-06-2	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,1-DICHLOROETHENE	75-35-4	0.007	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
CIS-1,3-DICHLOROPROPENE	156-59-2	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
TRANS-1,2-DICHLOROETHENE	156-60-5		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,2-DICHLOROPROPANE	78-87-5		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
CIS-1,3-DICHLOROPROPENE	10061-01-5		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
TRANS-1,3-DICHLOROPROPENE	10061-02-6		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
ETHYLBENZENE	100-41-4		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
2-HEXANONE	591-78-6		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
ISOPROPYLBENZZENE (CUMENE)	98-82-8		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
METHYL ACETATE	79-20-9		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
METHYLENE CHLORIDE	75-09-2	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
4-METHYL-2-PENTANONE (MIBK)	108-10-1		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
METHLY-TERT-BUTYL ETHER	1634-04-4		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
STYRENE	100-42-5	0.1	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,1,2,2-TETRACHLOROETHANE	79-34-5		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
TETRACHLOROETHENE	127-18-4		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
TOLUENE	108-88-3	1	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,1,1-TRICHLOROETHANE	71-55-6	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
1,1,2-TRICHLOROETHANE	79-00-5	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
TRICHLOROETHENE	79-01-6	0.002	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
TRICHLOROFLUOROMETHANE	75-69-4		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
VINYL CHLORIDE	75-01-4	0.002	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
M&P-XYLENE			ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
O-XYLENE	95-47-6		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005

LEGEND:
OVC: Organic Volatile Compounds
CAS NO: Chemical Abstract Service.
MCL: Maximum Contaminant Levelaccording to EPA mg/L
QA/QC: Quality Assurance/Quality Control.

MG/L: Miligrams per Liter.
Metodo 8260: According to EPA SW-846
RL: Reporting Limit
converted from ug/l to mg/l.

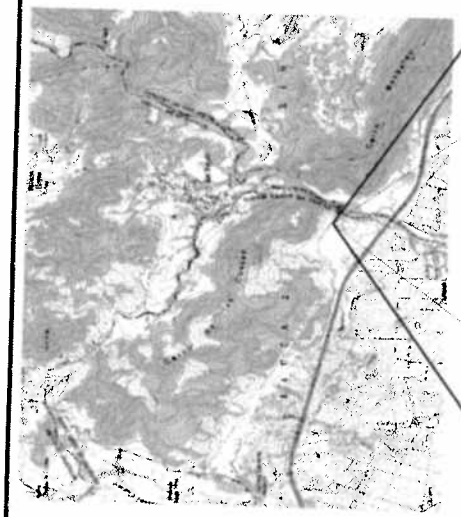
TABLE 2
SRS SANTA ISABEL
ANALITICAL RESULTS (MG/L)
METHOD 200.7 EPA
JUNE 2012

PARAMETER			QA/QC SAMPLES			WELL SAMPLES						
						UPGRADIENT		COMPLIANCE WELLS				
NOMBRE	CAS NO.	MCL	TB	FB	EB	N/A	N/A	GWMW-2	GWMW-2-D	GWMW-3	GWMW-3-D	RL (mg/L)
ANTIMONY	7440-36-0	0.06	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.06
ARSENIC	7440-38-2	0.05	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
BARIUM	7440-39-3	2	ND	ND	ND	N/A	N/A	ND	ND	0.281	0.267	0.2
BERYLLIUM	7440-41-7	0.004	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
CADMIUM	7440-43-9	0.005	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.005
CHROMIUM	7440-47-3	0.1	ND	ND	ND	N/A	N/A	ND	0.01	ND	ND	0.01
COBALT	7440-48-4		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
COPPER	7440-50-8	1.3	ND	ND	ND	N/A	N/A	0.046	0.0508	0.0219	0.0196	0.01
LEAD	7439-92-1	0.015	ND	ND	ND	N/A	N/A	0.0304	0.0327	0.0321	0.0318	0.005
NICKEL	7440-02-0		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.04
SELENIUM	7782-49-2	0.05	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.035
SILVER	7440-22-4		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
TALLIUM	7440-28-0	0.002	ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.01
VANADIUM	7440-62-2		ND	ND	ND	N/A	N/A	ND	ND	ND	ND	0.05
ZINC	7440-66-6	5	ND	ND	ND	N/A	N/A	3.59	4.02	1.09	0.941	0.02

LEJEND:
OVC: *Organic Volatile Compounds .*
CAS NO: Chemical Abstract Service.
MCL: Maximum Contaminant Level according to EPA mg/L
QA/QC: Quality Assurance/Quality Control.

MG/L: Miligrams per Liter.
Method 8260: Volatile Organic Compound Analysis EPA SW-846
RL: Reporting Limit.
converted from ug/l to mg/l.

TOPOGRAPHIC MAP



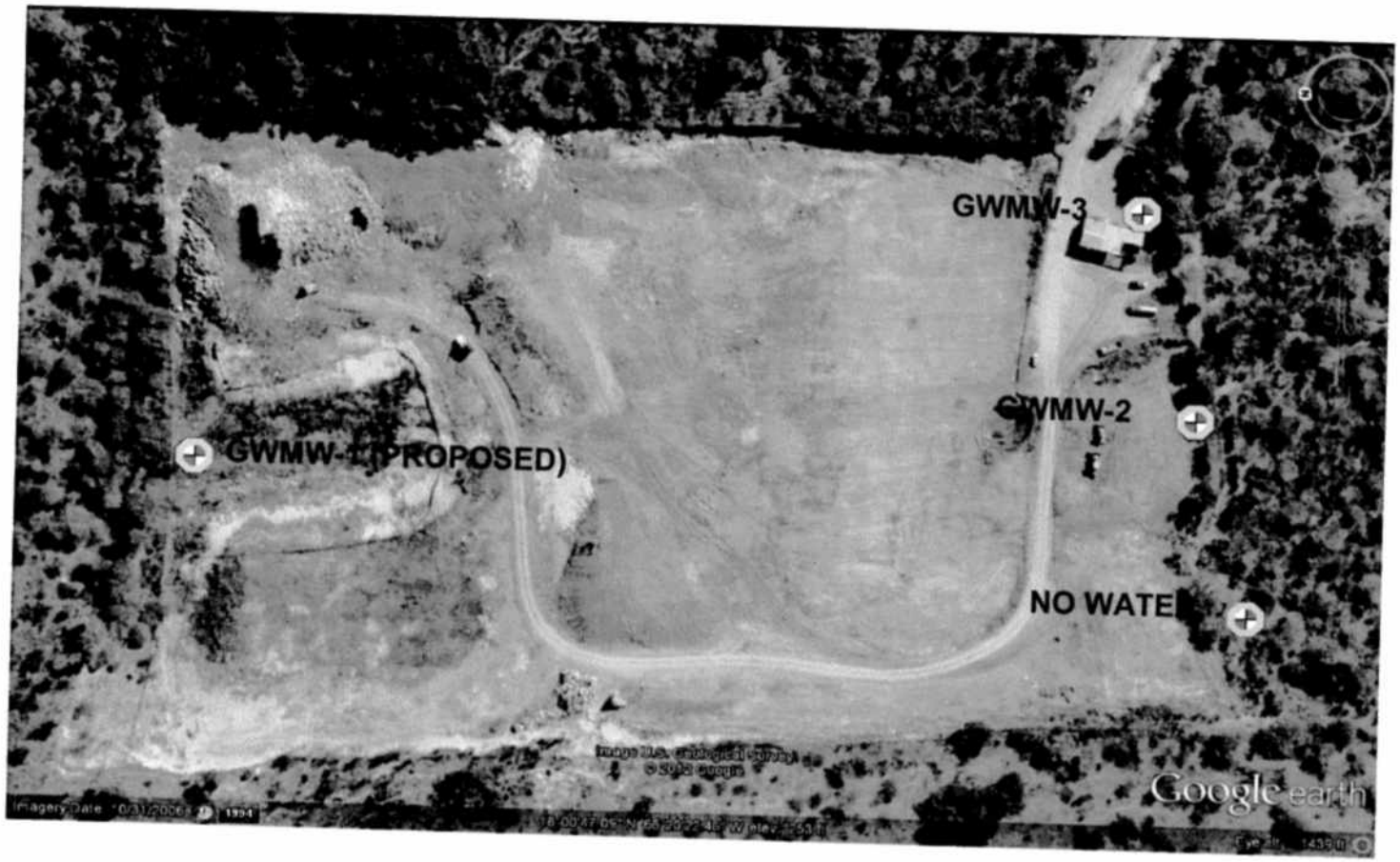
SANTA ISABEL LANDFILL PHOTO

PREPARED: O.Negrón	SANTA ISABEL LANDFILL MAP AND PHOTO		
REVISED: O.Negrón	LANDFILL GAS TECHNOLOGIES CORP.		
APPROVED: I.Perera	Groundwater & Environmental Services Puerto Rico, LLC 1418 Ave. Ponce De León, Suite 201, San Juan PR 00907		
NORTE	SCALE NTS	DATE: 6/7/2012	FIGURE: 1

LEGEND:

SAMPLING NETWORK

PREPARED: O.Negrón	**SANTA ISABEL LANDFILL GROUNDWATER MONITORING WELL NETWORK**		
REVISED: O.Negrón	**LANDFILL GAS TECHNOLOGIES CORP.**		
APPROVED: I.Perera	Groundwater & Environmental Services Puerto Rico, LLC 1418 Ave. Ponce De León, Suite 201, San Juan PR 00907		
NORTH	SCALTE NTS	DATE: 6/7/2012	FIGURE: **2**



LEGEND:

WELLS TO BE SAMPLED

PREPARED: O.Negrón	**LOCATION OF PROPOSED MONITORING WELLS FOR SAMPLING**		
REVISED: O.Negrón	**LANDFILL GAS TECHNOLOGIES CORP.**		
APPROVED: I.Perera	Groundwater & Environmental Services Puerto Rico, LLC 1418 Ave. Ponce De León, Suite 201, San Juan PR 00907		
NORTH	SCALTE NTS	DATE: 6/7/2012	FIGURE: 3

ANEJO 1

Copia de los Formularios de Campo

APPENDIX-1: FIELD SAMPLING DATA SHEET - SANTA ISABEL LANDFILL GROUNDWATER MONITORING PLAN									
SAMPLING EVENT LOCATION:	SRS SANTA ISABEL			EVENT START TIME:		0830AM			
DESCRIPTION OF WELL CONDITION	WELL I.D. AND TYPE								
	UPGRADIENT			COMPLIANCE			COMPLIANCE		
	GWMW-1 (PROPOSED)			GWMW-2 (BLUE WELL)			GWMW-3 (NEAR OFFICE)		
WEATHER	N/A			SUNNY			SUNNY		
GROUNDWATER PRESENCE DATA									
DEPTH OF WATER BEFORE DEVELOPME	N/A			42.56			43.5		
DEPTH OF WATER AFTER DEVELOPMEN	N/A			53.76			45.14		
WELL CONSTRUCTION DATA									
DEPTH OF WELL	N/A			77			70.55FT		
HEIGHT OF CASING	N/A			1FT			0FT		
WELL DIAMETER	N/A			2 INCH			2INCH		
LENGTH OF WATER COLUMN	N/A			34.44FT			27.05FT		
VOLUME OF WATER IN COLUMN	N/A			5G			4G		
VOLUMES TO BE REMOVED FROM WELL	N/A			15G			12G		
WELL DEVELOPMENT DATA									
SURGE TECHNIQUE	BAILER/PUMP			BAILER/PUMP			BAILER/PUMP		
SURGE START TIME	N/A			1130AM			1040AM		
SURGE END TIME	N/A			1206PM			1106AM		
DEVELOPMENT (3 VOLUMES)	W-1			GWMW-2			GWMW-3		
FIELD PARAMETER DATA	VOL (1)	VOL (2)	VOL (3)	VOL (1)	VOL (2)	VOL (3)	VOL (1)	VOL (2)	VOL (3)
GALLONS	N/A			5	5	5	4	4	4
WATER LEVEL (FT)	N/A			47.05	52	54.71	45.26	46.05	46.2
TIME (AM OR PM)	N/A			1141AM	1152AM	1206PM	1049AM	1058AM	1106AM
TEMP (^{O}C)	N/A			32.04	30.25	29.63	30.55	29.18	29.1
SPECIFIC CONDUCTANCE(mS/cm)	N/A			867	1363	2609	3175	3148	3185
PH	N/A			6.33	6.32	6.35	6.31	6.34	6.3
TURBIDITY (ntu)	N/A			N/A	N/A	N/A	N/A	N/A	N/A
DO (%)	N/A			47.3	42.3	55.4	52.7	34	24.4
TDS(MG/L)	N/A			N/A	N/A	N/A	N/A	N/A	N/A
SALINITY	N/A			N/A	N/A	N/A	N/A	N/A	N/A
COLOR	N/A			MURKY	MURKY	CLEAR	CLEAR	CLEAR	CLEAR
ODOR	N/A			NONE	NONE	NONE	NONE	NONE	NONE
SAMPLE TIME	N/A			GWMW-2(1209PM)			GWMW-3(1108AM)		
COMMENTS	N/A			NEEDS REPAIR			NEEDS REPAIRS		
EQUIPMENT	YSI 650								
LOGGED IN THE FIELD BY: JOSE L. BONILLA			END OF EVENT AT (TIME): 1220PM			SIGNATURE	Jose Bonilla		